

MANAGED FORESTS IN FUTURE LANDSCAPES

IMPLICATIONS FOR WATER AND CARBON CYCLES

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BOOK OF ABSTRACTS



EROSION AND RUNOFF IN YOUNG FOREST STANDS AS AFFECTED BY SITE-PREPARATION TECHNIQUE: A STUDY IN NE PORTUGAL

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ABSTRACT

Soil loss rates currently recorded in forests are very low. Nevertheless, that may not be the case during stand installation and early tree growth stage, when soil is disturbed and scarcely covered. Site-preparation techniques, performed to improve soil conditions for plant growth, should help reducing this erosion potential. In this study, six site-preparation techniques were applied prior to installing a mixed stand (*Pseudotsuga menziesii* and *Castanea sativa*) and a sub-sequent monitoring scheme of runoff and soil loss ran for two years in order to compare their effectiveness for erosion control. The experimental area, near Macedo de Cavaleiros, NE Portugal, at 700 m elevation, with annual means of 678 mm rainfall and 12°C temperature, has Mediterranean climatic conditions. Experimental design comprised three blocks, corresponding to different topographic positions (near flat plateau, gentle slope shoulder, steep mid-slope), where eight treatments were randomly distributed in plots with 375 m² area: (1) no operation (original soil control); (2) continuous subsoiling against the contour (potential erosion control); (3) no tillage and hole plantation using a hole digger; (4) continuous subsoiling, using a covering shovel; (5) no subsoiling and furrow-hillock surface shaped by two plough passes; (6) subsoiling in the future plantation rows and furrow-hillock surface shaped by two plough passes; (7) continuous subsoiling and furrow-hillock surface shaped by two plough passes; (8) continuous subsoiling, followed by continuous ploughing. Sediment and water exported from small plots (2.5 m² average area), two replicates per treatment and block, were collected after each rainfall erosion event, in a total of twenty, summing about 1800 mm precipitation in two years. Mean annual runoff and soil loss in the original soil were 3.4 mm and 11.6 g m⁻², respectively. In treatments 3 to 8, values were higher 3 to 7 times, for runoff, and 5 to 12 times, for soil loss. Potential erosion averages 2.3 t ha⁻¹ y⁻¹. Soil loss and runoff tend to increase with tillage intensity associated to site-preparation technique, even though average two-year losses, in all cases, are below tolerable rates. Soil loss and runoff rates decreased with time, becoming globally negligible after two years.

KEYWORDS: runoff, erosion, site preparation, *Castanea sativa*, *Pseudotsuga menziesii*